

REMARKS

Support for the Amendments

Claim 26 has been amended to require that the composition be water-soluble, contain seven or more nitrogen atoms and not contain a carbonyl group in its base skeleton. Support for the limitation of “water-soluble” is found, for example, on page 10, lines 7-10 and 34-36. Support for the limitation of the base skeleton “having seven or more nitrogen atoms” is found, for example, on page 10, lines 7-10 and 19-23. A molecular weight of 300 Da for polyethylenimine corresponds to approximately seven ethylenimine units, and thus seven nitrogen atoms, in a molecule. Since 300 Da is a lower limit, seven nitrogen atoms is a lower limit. Furthermore, one skilled in the art would recognize, based on the teachings on the preferred number of carbons (1-10) in lower alkylenimine monomers used to prepare polyalkylenimines of the invention, that polyalkylenimines, other than polyethylenimine, containing seven or more nitrogen atoms are possible. Finally, support for the limitation requiring that no carbonyl groups be present in the base skeleton is found throughout the specification. Not one example of a base skeleton (e.g., tetraspermine) in the specification includes a carbonyl group, and the term “polyalkylenimine” implies that no carbonyl groups are present in the base skeleton. Claims 27 and 28 have respectfully been amended to delete the phrase “a saturated or unsaturated acyloxycarbonyl group.” In addition, claim 28 has been amended to correct typographical errors and to remove the phrase “the base skeleton” from specified locations. Claims 29, 30, 32, 33, 36, 37, 39, 40, 44-46, and 50 have been amended to correct typographical errors.

The Office Action

Claims 26-50 are pending. Claims 28, 30-42, and 46 stand rejected for indefiniteness. Claims 26-29 stand rejected for anticipation by Khmelnitsky et al. (Eur. J. Biochem. 1992, 206:737-745; hereafter “Khmelnitsky”). Claims 26-29, 33, 36, 40, and 43-50 stand rejected for anticipation by Byk et al. (WO 97/18185; hereafter “Byk”). Claims 26-29, 33, and 43-50 stand rejected for anticipation by Wolff et al. (U.S. Patent No. 5,744,335; hereafter “Wolff”). Claim 26 is objected to for incorrectly spelling “polyalkylenimine.”

Preliminary Amendment

The Examiner states that “applicant has used underlining in such a manner that it is unclear to the examiner whether the underlining in claims 29, 36, 47 and 49-50 is intended to appear in the patent.” Applicants submit that the underlining is unintentional and is not intended to appear in the claims.

Priority

Applicants submit herewith, under 37 C.F.R. § 1.55, an English translation of Japanese Patent Applicant No. Hei 10-48187 and a statement by Kazunori Hashimoto verifying that the translation is true and correct.

Claim Objections

Claim 26 is objected to for reciting the term “polyealkylenimine.” Applicants now amend claim 26 to recite the term “polyalkylenimine,” and the objection may be withdrawn.

Rejections under 35 U.S.C. § 112, second paragraph

Claims 28, 30-42, and 46 stand rejected for indefiniteness. The basis for this rejection is addressed below.

Claim 28 was deemed indefinite for reciting the term “polyalkylenimine,” which lacks antecedent basis in claim 26. As stated above, amended claim 26 now recites “polyalkylenimine,” and the rejection may be withdrawn.

Claims 30-32 were deemed indefinite for reciting “[t]he compositions of claim 29,” since claim 29 is directed to a single composition. Claims 30-32 have now been amended to recite the term “composition,” and the rejection may be withdrawn.

Claims 36-42 were deemed indefinite for reciting the term “the base skeleton,” as there is no antecedent basis for this term in claim 26. Claim 36, from which claims 37-42 depend, has now been amended to depend from claim 28, and the rejection may be withdrawn.

Claims 31-35, 38, 39, 41, and 42 were deemed indefinite for reciting terms lacking antecedent basis in claim 26. Claims 29 and 36, from which claims 31-35, 38, 39, 41, and 42 depend, have now been amended to depend from claim 28 and not directly from claim 26. Claim 28 provides antecedent basis for “any two or more of side chains R’, R¹,

R^m , or R^{m+1} comprise a group selected from the group consisting of,” and the rejection may be withdrawn.

Claim 46 was deemed indefinite for reciting “phosphotidylcholine.” The claim has now been amended to recite “phosphatidylcholine,” and the rejection may be withdrawn.

Rejections under 35 U.S.C. § 102

Claims 26-29, 33, 36, 40, and 43-50 were rejected as being anticipated by Khmelnitsky, Byk, and Wolff. For the following reasons, Applicants submit that the rejections are not applicable to the amended claims. As amended, claim 26 (and its dependent claims) requires a water-soluble composition that includes a polyalkylenimine or a salt thereof. This polyalkylenimine or its salt includes (a) two or more hydrophobic groups, (b) seven or more nitrogen atoms, and (c) a base skeleton that does not contain a carbonyl group.

With respect to claims 26-29, the Office states that Khmelnitsky teaches a polyalkylenimine containing two hydrophobic groups. Claim 26 (and its dependent claims), as amended, requires a water-soluble composition containing a polyalkylenimine including a base skeleton and two or more hydrophobic groups. The compounds of Khmelnitsky are “slightly soluble in water” (e.g., 0.1 mg/ml for CEPEI; pg. 740) but highly soluble in organic solvents (e.g., at least 132 mg/ml in 2:1 benzene:*n*-butanol for CEPEI; pg. 738). Based on these data, one skilled in the art would not consider the compositions of Khmelnitsky to be water-soluble, as the term is generally understood

regarding polyalkylenimines. In contrast, the compositions of the present invention are designed to be soluble in water, and the specification teaches that low water-solubility is not preferred (pg. 10, ll. 34-36). Since the compositions of Khmelnitsky are not water-soluble, as required by amended claim 26, Khmelnitsky does not anticipate claims 26-29, and the rejection may be withdrawn.

With respect to claims 26-29, 33, 36, 40, and 43-50, the Office states that Byk discloses polyamines having at least two hydrophobic regions. Applicants note that Byk discloses compositions containing a carbonyl group in the base skeleton. As amended, claim 26 (and its dependent claims) requires that the base skeleton not contain a carbonyl group. Since the base skeletons of Byk and the present invention are different, Byk does not anticipate claim 26, and the rejection may be withdrawn.

With respect to claims 26-29, 33, and 43-50, it is stated that Wolff discloses polyalkylenimine compounds that include at least one hydrophobic group. Applicants note that the compositions of Wolff all contain five or fewer nitrogen atoms. In contrast, claim 26 (and its dependent claims), as amended, requires seven or more nitrogen atoms. Since the compositions of Wolff do not contain seven or more nitrogen atoms, Wolff does not anticipate claim 26, and the rejection may be withdrawn.

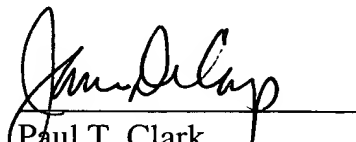
CONCLUSIONS

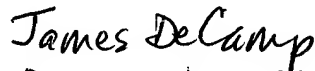
Applicants submit that the claims are in condition for allowance, and such action is respectfully requested. Enclosed is a petition to extend the period for replying for three months, to and including February 28, 2002. If there are any charges, or any credits, please apply them to Deposit Account No. 03-2095.

Respectfully submitted,

Date: 28 February 2002

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PATENT TRADEMARK OFFICE

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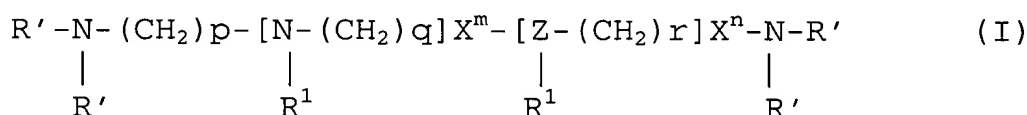
Version with Markings to Show Changes

Marked up versions of claims 26-30, 32, 33, 36, 37, 39, 40, 44-46, and 50 are as follows.

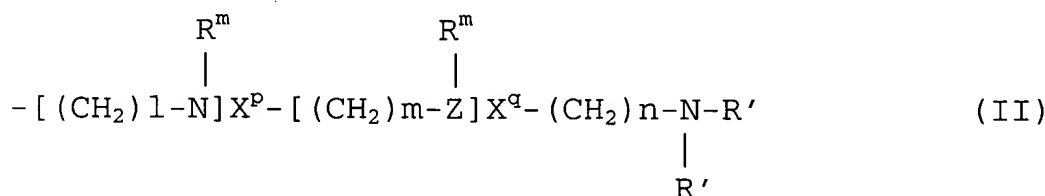
26. (Amended) A water-soluble composition comprising a [polyalkylenimine having] polyalkylenimine or a salt thereof, wherein said polyalkylenimine or said salt comprises (a) two or more hydrophobic groups, (b) seven or more nitrogen atoms, and (c) a base skeleton that does not comprise a carbonyl group [or its salt].

27. (Amended) The composition of Claim 26, wherein the hydrophobic group is a cholesterol residue, a saturated or unsaturated alkyl group, a saturated or unsaturated acyl group, [a saturated or unsaturated acyloxycarbonyl group,] or a phospholipid residue.

28. (Amended) The composition of Claim 26, wherein the polyalkylenimine [having two or more hydrophobic groups] is a compound represented by formula (I):

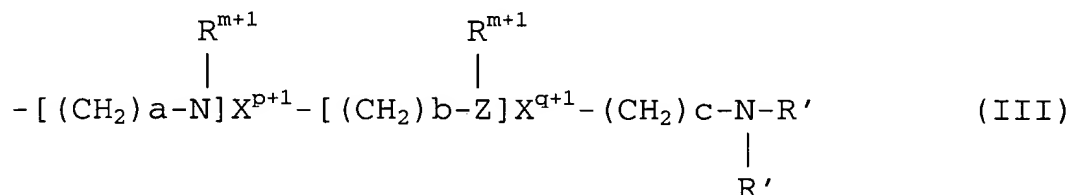


wherein the base skeleton may contain an amide bond; Z represents a carbon or nitrogen atom; R' represents hydrogen, a cholesterol residue, a saturated or unsaturated alkyl group, a saturated or unsaturated acyl group, [a saturated or unsaturated acyloxycarbonyl group,] or a phospholipid residue; two R's binding to the same nitrogen atom can be identical or different; a side chain R¹ is hydrogen, a cholesterol residue, a saturated or unsaturated alkyl group, a saturated or unsaturated acyl group, [a saturated or unsaturated acyloxycarbonyl group,] a phospholipid residue, or below formula (II); and p, q, r, Xⁿ, and X^m represent arbitrary natural numbers:



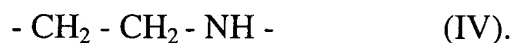
wherein [the base skeleton and] the side chain R^m may comprise [contain] an amide bond; Z represents a carbon or nitrogen atom; R' represents hydrogen, a cholesterol residue, a saturated or unsaturated alkyl group, a saturated or unsaturated acyl group, [a saturated or unsaturated acyloxycarbonyl group,] or a phospholipid residue; two R's binding to the same nitrogen atom can be identical or different; a side chain R^m is hydrogen, a cholesterol residue, a saturated or unsaturated alkyl group, a saturated or unsaturated acyl

group, [a saturated or unsaturated acyloxycarbonyl group,] a phospholipid residue, or below formula (III); and l, m, n, X^p , and X^q represent arbitrary natural numbers:



wherein [the base skeleton and the base skeleton of] the side chain R^{m+1} may comprise [contain] an amide bond; Z represents a carbon or nitrogen atom; R' represents hydrogen, a cholesterol residue, a saturated or unsaturated alkyl group, a saturated or unsaturated acyl group, [a saturated or unsaturated acyloxycarbonyl group,] or a phospholipid residue; two R's binding to the same nitrogen atom can be identical or different; and a, b, c, X^{p+1} , and X^{q+1} represent arbitrary natural numbers.

29. (Amended) The composition of [Claim 26] Claim 28, comprising the repeating structure of formula (IV) in the base skeleton:



30. (Amended) The composition[s] of Claim 29, wherein two to five molecules of tetraethylenepentamine are linked in a linear manner.

32. (Amended) The composition of Claim 30, wherein any two or more of side chains R' , R^l , R^m , or R^{m+1} comprise a group selected from the group consisting of [a] butyl, pentyl, hexyl, heptyl, octyl, nonyl, decyl, undecyl, dodecyl, tridecyl, tetradecyl, pentadecyl, hexadecyl, heptadecyl, and octadecyl groups.

33. (Amended) The composition of Claim 29, wherein the structures of [containing the] formula (IV) are linked in a branched manner.

36. (Amended) The composition of [Claim 26] Claim 28, wherein the base skeleton comprises one or more [contains a] spermine structures.

37. (Amended) The composition of Claim 36, wherein two to five molecules of spermine[s] are linked in a linear manner.

39. (Amended) The composition of Claim 36, wherein any two or more of side chains R' , R^l , R^m , or R^{m+1} comprise a group selected from the group consisting of [a] butyl, pentyl, hexyl, heptyl, octyl, nonyl, decyl, undecyl, dodecyl, tridecyl, tetradecyl, pentadecyl, hexadecyl, heptadecyl, and octadecyl groups.

40. (Amended) The composition of Claim 36, wherein the spermine structures are [is] linked in a branched manner.

44. (Amended) The composition of Claim 43, wherein the phospholipid is a neutral or basic phospholipid.

45. (Amended) The composition of Claim 44, wherein the phospholipid comprises a phosphatidylethanolamine[,] or phosphatidylcholine skeleton.

46. (Amended) The composition of [Claim 45] Claim 44, wherein the phospholipid is [dioleylphosphotidylethanolamine, or phosphotidylcholine] a dioleylphosphatidylethanolamine or phosphatidylcholine.

50. (Amended) A kit for preparing the composition of Claim 44, comprising a phospholipid and a polyalkylenimine or a salt thereof having two or more hydrophobic groups per molecule [or its salt].